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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

Inventor(s): Dantanarayana

Filed: June 22, 2001

Title: AN APPARATUS FOR SUPPLYING BREATHABLE GAS

DATE June 22, 2001

PRELIMINARY AMENDMENTHon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Please amend this application as follows:

IN THE SPECIFICATION:

At the top of the first page, just under the title, insert

☒ --This application is the National Phase of International Application
PCT/AU99/01146 filed 23 December 1999 which designated the U.S.
and that International Application☒ was ☐ was not published under PCT Article 21(2) in English.--

Respectfully submitted,

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PCT/CAU99/01146AN APPARATUS FOR SUPPLYING BREATHABLE GAS

FIELD OF THE INVENTION

The present invention relates to an apparatus for supplying breathable gas.

The invention has been developed primarily for use in Continuous Positive Airway Pressure (CPAP) treatment of, for example, Obstructive Sleep Apnea (OSA) and other ventilatory assistance treatments such as Non Invasive Positive Pressure Ventilation (NIPPV) and will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to these particular uses.

BACKGROUND OF THE INVENTION

CPAP treatment is a common ameliorative treatment for breathing disorders including OSA. CPAP treatment, as described in US Patent No. 4,944,310, provides pressurised air or other breathable gas to the entrance of a patient's airways at a pressure elevated above atmospheric pressure, typically in the range 4-20 cm H₂O.

It is also known for the level of treatment pressure to vary from breath to breath in accordance with patient need, that form of CPAP being known as automatically adjusting nasal CPAP treatment, as described in US Patent No. 5,245,995.

NIPPV is another form of treatment for breathing disorders which can involve a relatively higher pressure of gas being provided in the patient mask during the inspiratory phase of respiration and a relatively lower pressure or atmospheric pressure being provided in the patient mask during the expiratory phase of respiration.

In other NIPPV modes the pressure can be made to vary in a complex manner throughout the respiratory cycle. For example, the pressure at the mask during inspiration or expiration can be varied through the period of treatment.

Typically, the ventilatory assistance for CPAP or NIPPV treatment is delivered to the patient by way of a nasal mask. Alternatively, a mouth mask or full face mask or nasal prongs can be used. In this specification any reference to a mask is to be understood as incorporating a reference to a nasal mask, mouth mask, full face mask or nasal prongs.

In this specification any reference to CPAP treatment is to be understood as embracing all of the above described forms of ventilatory treatment or assistance.

A CPAP apparatus broadly comprises a flow generator constituted by a continuous source of air or other breathable gas generally in the form of a blower driven by an electric motor. A hospital piped supply can also be used. The gas supply

is connected to a conduit or tube, which in turn is connected to a patient mask which incorporates, or has in close proximity, an exhaust to atmosphere for venting exhaled gases. The electric motor driving the blower is typically controlled by a servo-controller under the control of a microcontroller unit.

5 The noise produced by the electric motor and blower has three basic transmission paths to surrounding atmosphere. It is radiated from the apparatus housing, transmitted from the blower outlet to be propagated along the conduit that connects the outlet the apparatus to the patient mask and transmitted from the blower inlet to propagate along the gas inlet path (in the opposite direction of the gas flow) to
10 the housing gas inlet and so to atmosphere. As CPAP apparatus are generally located in the same room of the patient being treated, generally within about 1 or 2 m of the patient, it is extremely desirable to minimise the noise the CPAP apparatus produces in order to maximise treatment compliance and also the comfort of the patient and/or any bed partner.

15 It is an object of the present invention to reduce the noise radiated from the apparatus housing.

SUMMARY OF THE INVENTION

Accordingly, in a first aspect, the present invention provides an apparatus for supplying breathable gas, the apparatus including:

20 a relatively rigid external housing;
at least one noise producing component internal the housing; and
a thin flexible enclosure substantially sealed around the noise producing components.

25 Preferably, the flexible enclosure is produced from plastic material. For example, the enclosure can be made from a polymer such as Cosmothene F221-1 or polyethylene.

The flexible enclosure preferably includes an opening adapted to allow passage of the internal component(s) into the interior of the flexible enclosure. The opening is desirably sealable by adhesive tape.

30 The enclosure preferably includes one or more apertures to allow breathable gas into and out of the noise producing component(s).

The noise producing components can include a blower, an inlet muffler or an outlet muffler. Atmospheric air is preferably drawn through the inlet muffler before entering the blower and the resulting pressurised air preferably passes through the
35 outlet muffler after leaving the blower. The enclosure preferably includes a first aperture substantially sealable with respect to the exterior of the inlet of the inlet muffler and a second aperture substantially sealable with respect to the exterior of the